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(54) ORTHOPEDIC INSTRUMENT AND SYSTEM FOR IMPLANTING AN ACETABULAR CUP

ORTHOPÄDISCHES INSTRUMENT UND SYSTEM ZUM IMPLANTIEREN EINER HÜFTGELENKSPFANNE

INSTRUMENT ORTHOPÉDIQUE ET SYSTÈME POUR IMPLANTER UN COTYLE PROTHÉTIQUE

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(56) References cited:
WO-A1-2004/069107
DE-A1-102008 022 329
FR-A1- 2 776 182
US-A- 3 916 451
US-A- 5 431 657
US-A- 5 540 697
US-A- 5 584 837
US-A1- 2005 085 820
US-A1- 2005 203 535
US-A1- 2009 192 621

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention has to do with an orthopedic instrument and its use in hip replacement surgery for implanting an acetabular cup in the pelvis of a patient. More specifically, the invention relates to a new orthopedic instrument designed for implanting the reverse hip acetabular cup described in Published PCT Application No. WO 2011-112353-A1, dated September 15, 2011, and entitled "Interlocking Reverse Hip and Revision Prosthesis" and its parent, Published U.S. Patent Application No. 2011-0218637-A1, dated September 8, 2011.

2. The Related Art

[0002] The prior art discloses apparatus for implanting various portions of a prosthesis, such as an acetabular cup, into an anatomy. For example, U.S. Patent No. 7,727,282 discloses an apparatus that rigidly engages a prosthesis member to allow for positioning it relative to the anatomy. Other documents disclose similar apparatus, like international patent application WO 2004/069107, DE102008022329, US5540697, FR2776182, US5431657, US 3916451, US 2005/085820, US 2005/203535, US5584837 and US 2009/192621. The apparatus disclosed in these documents do not allow engaging a reverse hip prosthesis to the anatomy satisfactorily.

SUMMARY OF THE INVENTION

[0003] The orthopedic instrument of the invention was developed to implant a revolutionary new reverse hip prosthesis in a patient. In particular, the instrument is used to position and securely affix the acetabular cup component of the prosthesis in the pelvis of a patient.

[0004] Two methods of using the instrument are available to the surgeon. In one method, the acetabular cup is affixed to the pelvis without using screws and in the other method at least one screw is used. Drill guides can be incorporated in the instrument in case the surgeon wishes to use screws.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The mechanical elements of the invention are illustrated in the drawings summarized as follows:

Fig. 1 is a semi-transparent elevational view of the orthopedic instrument.

Fig. 2 is a top section view of the acetabular impactor taken along section line 2-2 of Fig. 1.

Fig. 3 illustrates a section view of the acetabular impactor with the acetabular cup releasably engaged thereto.

Fig. 4 is a perspective view of the acetabular cup.

Fig. 5 illustrates in perspective a sleeve used to guide the drill bit when a screw hole is drilled in the pelvic bone.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0006] Referring to the drawings, the main components of the orthopedic instrument **22** are a handle **20** and an acetabular impactor **21**. The handle **20** is comprised of a shaft **9**, an impactor head **10** at the proximal end of the shaft **9** and a threaded portion at the distal end. The threaded portion of the handle is comprised of an axially disposed, internally threaded annular portion. The acetabular impactor **21** is comprised of threads **8** at the proximal end for removably affixing the acetabular impactor **21** to the handle **20** by screwing the acetabular impactor **21** and handle **20** together. The threads **8** are comprised of an axially disposed externally threaded portion. In a variation of the invention which is not illustrated in the drawings, the threads on the handle can be external and the threads on the acetabular impactor can be internal.

[0007] Other elements of the acetabular impactor **21** include recess **1,** hemispherical head **2,** proximal conical extension **11,** retaining tongues **5,** release levers **6,** hemicircular retaining ring **7** and recesses **17.** The retaining ring **7** acts as a spring to allow the retaining tongues **5** to move laterally to removably engage the acetabular cup **14.** Optional elements of the acetabular impactor include conical protective/supportive sheet **12** and channels **3** and **4** as drill guides and for screw insertion.

[0008] The acetabular cup **14** has a stem **15** which is accommodated by recess **1** in acetabular impactor **21.** A circumferential groove **16** is located in the concave surface of the acetabular cup in proximity to the circumferential edge of the cup. As illustrated in Fig. 3, the retaining tongues **5** engage the circumferential groove **16** when the acetabular cup is releasably engaged with the orthopedic instrument **22.** In a variant of the invention, reference number **16** can designate diametrically opposed recesses for the retaining tongues **5.** Surface **18** of the acetabular cup is adapted for secure attachment to the acetabular socket of a pelvis. In a preferred embodiment the surface **18** is convex but other shapes suitable for secure attachment to a pelvic bone can be used as will be apparent to those skilled in the art. Referring to Fig. 4, the screw holes **25** are optionally threaded and preferably are threaded in a portion of the holes having a Morse taper, the taper having a larger diameter on the concave surface **19** of the acetabular cup **14** and a smaller diameter on the opposite side **18,** said opposite side preferably having a convex shape.

[0009] An orthopedic system is provided according to the invention when the acetabular cup **14** is removably engaged with the orthopedic instrument **22** or when the

acetabular cup **14** is removably engaged with the acetabular impactor **21.**

[0010] The apparatus according to the invention could be used according to at least two methods. The first method is employed when the surgeon does not use screws to affix the acetabular cup **14** in the pelvis. The second method is employed when the surgeon uses at least one screw to affix the acetabular cup **14** to the pelvis.

[0011] In the first method, the acetabular cup **14** is releasably engaged with the distal end of the orthopedic instrument **22** by snap fitting the cup over the retaining tongues **5** to engage the circumferential groove **16.** Then the acetabular cup **14** is positioned in the acetabular socket of the pelvis and the impactor head **10** is impacted, such as with a hammer, to affix the acetabular cup **14** in the acetabular socket. The orthopedic instrument **22** then is released from the acetabular cup by pressing release levers **6** inwardly.

[0012] In the second method, the acetabular cup **14** is releasably engaged with the distal end of the orthopedic instrument **22** in the same manner as described above. Then the acetabular cup **14** is positioned in the acetabular socket of the pelvis and the impactor head **10** is impacted to set the acetabular cup **14** in place. Then the handle **20** is unscrewed from the acetabular impactor **21** and a sleeve **23** of Fig. 5 is inserted into one or both of channels **3** or **4.** Sleeve **23** is also optionally provided with threads **24,** preferably on a Morse taper, to mate with the threads in screw holes **25.** When a sleeve **23** is threaded into a screw hole **25,** the sleeve will not spin during drilling and the engagement of the acetabular cup **14** with the acetabular impactor **21** is enhanced. The sleeve **23** is sized with suitable outer and inner diameters to prevent or minimize wobbling of the drill bit during drilling of the pelvic bone. The length of the sleeve **23** is sized to insure that the drill bit penetrates the bone to the appropriate depth without going too deep. After the hole is drilled, the sleeve **23** is removed, the screws are installed and the acetabular impactor **21** is released from the acetabular cup **14** as described above.

Claims

1. An orthopedic instrument (22) for implanting an acetabular cup (14) having a surface (18) for attachment to an acetabular socket in a pelvic bone and a concave surface (19) having an acetabular cup stem (15) affixed therein and projecting outwardly therefrom, the concave surface (19) further comprising a circumferential groove (16) located in proximity to a circumferential edge of the acetabular cup (14), the orthopedic instrument (22) comprising
a handle (20) comprising a shaft (9) having an impactor head (10) at a proximal end and an axially disposed first threaded annular portion at a distal end,
an acetabular impactor (21) having a hemispherical head (2) at a distal end and an axially disposed second threaded annular portion (8) at a proximal end, the second threaded annular portion (8) being screwed into the first threaded annular portion removably affixing the handle (20) to the acetabular impactor (21),
the hemispherical head (2) being configured to couple to the acetabular cup (14),
characterized in that the hemispherical head (2) comprises an annular recess (1) to receive the acetabular cup stem (15),
and **in that** the hemispherical head (2) furthermore comprises retaining tabs (5) configured to releasably engage the circumferential groove (16).

2. The orthopedic instrument (22) of claim 1, the acetabular cup (14) further comprising at least one screw hole (25) to accommodate a screw for attaching the acetabular cup (14) to the pelvic bone, the acetabular impactor (21) further comprising at least one channel (3, 4) configured as a drill guide.

3. The orthopedic instrument (22) of claim 1 or 2 wherein the first threaded annular portion is internally threaded and the second threaded annular portion (8) is externally threaded.

4. The orthopedic instrument (22) of claim 1 or 2, wherein the first threaded annular portion is externally threaded and the second threaded annular portion (8) is internally threaded.

5. An orthopedic system for implanting an acetabular cup (14), the system comprising
the orthopedic instrument of any one of claims 1 to 4, and
an acetabular cup (14) having a surface (18) for attachment to an acetabular socket in a pelvic bone and a concave surface (19) having an acetabular cup stem (15) affixed therein and projecting outwardly therefrom, the concave surface (19) further comprising a circumferential groove (16) located in proximity to a circumferential edge of the acetabular cup (14).

6. The orthopedic system of claim 5, the acetabular cup (14) further comprising at least one screw hole (25) to accommodate a screw for attaching the acetabular cup (14) to the pelvic bone, the acetabular impactor (21) further comprising at least one channel (3,4) configured as a drill guide.

Patentansprüche

1. Orthopädisches Instrument (22) zum Implantieren einer Hüftgelenkspfanne (14) mit einer Oberfläche (18) zur Befestigung an einer Hüftgelenkslippe in ei-

nem Beckenknochen und eine konkave Oberfläche (19) mit einem darin befestigten und daraus auswärts herausragenden Hüftgelenkspfannenschaft (15), wobei die konkave Oberfläche (19) weiterhin eine umlaufende Nut (16) umfasst, die in der Nähe einer umlaufenden Kante der Hüftgelenkspfanne (14) lokalisiert ist, wobei das orthopädische Instrument (22) umfasst einen Griff (20), umfassend einen Schaft (9) mit einem Impaktorkopf (10) an einem proximalen Ende und einen axial angeordneten, ersten ringförmigen Abschnitt an einem distalen Ende,
einen Hüftimpaktor (21) mit einem hemisphärischen Kopf (2) an einem distalen Ende und einem axial angeordneten zweiten ringförmigen Abschnitt (8) mit Gewinde an einem proximalen Ende, wobei der zweite ringförmige Abschnitt (8) mit Gewinde in den ersten ringförmigen Abschnitt mit Gewinde geschraubt ist und den Griff (20) abnehmbar an dem Hüftimpaktor (21) befestigt,
wobei der hemisphärische Kopf (2) konfiguriert ist, um an die Hüftgelenkspfanne (14) anzukoppeln,
dadurch gekennzeichnet, dass der hemisphärische Kopf (2) eine ringförmige Vertiefung (1) zur Aufnahme des Hüftgelenkspfannenschaftes (15) umfasst
und dass der hemisphärische Kopf (2) weiterhin eine Befestigungslasche (5) umfasst, die konfiguriert ist, um lösbar in die umlaufende Nut (16) einzugreifen.

2. Orthopädisches Instrument (22) gemäß Anspruch 1, wobei die Hüftgelenkspfanne (14) weiterhin wenigstens ein Schraubenloch (25) umfasst, um eine Schraube zur Befestigung der Hüftgelenkspfanne (14) an dem Beckenknochen aufzunehmen, wobei der Hüftimpaktor (21) weiterhin wenigstens einen Kanal (3, 4) umfasst, der als eine Bohrführung konfiguriert ist.

3. Orthopädisches Instrument (22) gemäß Anspruch 1 oder 2, wobei der erste ringförmige Abschnitt mit Gewinde ein internes Gewinde hat und der zweite ringförmige Abschnitt (8) mit Gewinde (8) ein externes Gewinde hat.

4. Orthopädisches Instrument (22) gemäß Anspruch 1 oder 2, wobei der erste ringförmige Abschnitt mit Gewinde ein externes Gewinde hat und der zweite ringförmige Abschnitt mit Gewinde (8) ein internes Gewinde hat.

5. Orthopädisches System zum Implantieren einer Hüftgelenkspfanne (14), wobei das System umfasst das orthopädische Instrument gemäß irgendeinem der Ansprüche 1 bis 4 und
eine Hüftgelenkspfanne (14) mit einer Oberfläche (18) zur Befestigung an einer Hüftgelenkslippe in einem Beckenknochen und eine konkave Oberfläche (19) mit einem daran befestigten und davon auswärts hervorstehenden Hüftgelenkspfannenschaft (15), wobei die konkave Oberfläche (19) weiterhin eine umlaufende Nut (16) umfasst, die in der Nähe einer umlaufenden Kante der Hüftgelenkspfanne (14) lokalisiert ist.

6. Orthopädisches System gemäß Anspruch 5, wobei die Hüftgelenkspfanne (14) weiterhin wenigstens ein Schraubenloch (25) zur Aufnahme einer Schraube für die Befestigung der Hüftgelenkspfanne (14) an dem Beckenknochen umfasst, wobei der Hüftgelenksimpaktor (21) weiterhin wenigstens einen Kanal (3, 4) umfasst, der als eine Bohrführung konfiguriert ist.

Revendications

1. Instrument orthopédique (22) pour implanter une cupule acétabulaire (14) présentant une surface (18) à attacher à un fourreau acétabulaire dans un os pelvien, et une surface concave (19) présentant une tige de cupule acétabulaire (15) fixée dans celle-ci et faisant saillie vers l'extérieur à partir de celle-ci, la surface concave (19) comportant en outre une rainure circonférentielle (16) située à proximité d'un bord circonférentiel de la cupule acétabulaire (14), l'instrument orthopédique (22) comprenant:

un manche (20) comprenant un arbre (9) présentant une tête d'impacteur (10) à une extrémité proximale et une première partie annulaire filetée disposée axialement à une extrémité distale,
un impacteur acétabulaire (21) présentant une tête hémisphérique (2) à une extrémité distale et une seconde partie annulaire filetée disposée axialement (8) à une extrémité proximale, la seconde partie annulaire filetée (8) étant vissée dans la première partie annulaire filetée, fixant de façon détachable la poignée (20) à l'impacteur acétabulaire (21),
la tête hémisphérique (2) étant configurée de manière à être couplée à la cupule acétabulaire (14),
caractérisé en que la tête hémisphérique (2) comporte un évidement annulaire (1) pour recevoir la tige de cupule acétabulaire (15), et en ce que
la tête hémisphérique (2) comprend en outre des onglets (5) configurés de manière à s'engager de façon amovible dans la rainure circonférentielle (16).

2. Instrument orthopédique (22) selon la revendication 1, dans lequel la cupule acétabulaire (14) comporte en outre au moins un trou de vis (25) pour recevoir une vis pour attacher la cupule acétabulaire (14) à

l'os pelvien, l'impacteur acétabulaire (21) comprenant en outre au moins un canal (3, 4) configuré comme un guide de foret.

3. Instrument orthopédique (22) selon la revendication 1 ou 2, dans lequel la première partie annulaire filetée est filetée intérieurement et la seconde partie annulaire filetée (8) est filetée extérieurement.

4. Instrument orthopédique (22) selon la revendication 1 ou 2, dans lequel la première partie annulaire filetée est filetée extérieurement, et la seconde partie annulaire filetée (8) est filetée intérieurement.

5. Système orthopédique pour implanter une cupule acétabulaire (14), le système comprenant:

l'instrument orthopédique selon l'une quelconque des revendications 1 à 4, et
une cupule acétabulaire (14) présentant une surface (18) à attacher à un fourreau acétabulaire dans un os pelvien, et une surface concave (19) présentant une tige de cupule acétabulaire (15) fixée dans celle-ci et faisant saillie vers l'extérieur à partir de celle-ci, la surface concave (19) comportant en outre une rainure circonférentielle (16) située à proximité d'un bord circonférentiel de la cupule acétabulaire (14).

6. Système orthopédique selon la revendication 5, dans lequel la cupule acétabulaire (14) comporte en outre au moins un trou de vis (25) pour recevoir une vis pour attacher la cupule acétabulaire (14) à l'os pelvien, l'impacteur acétabulaire (21) comprenant en outre au moins un canal (3, 4) configuré comme un guide de foret.

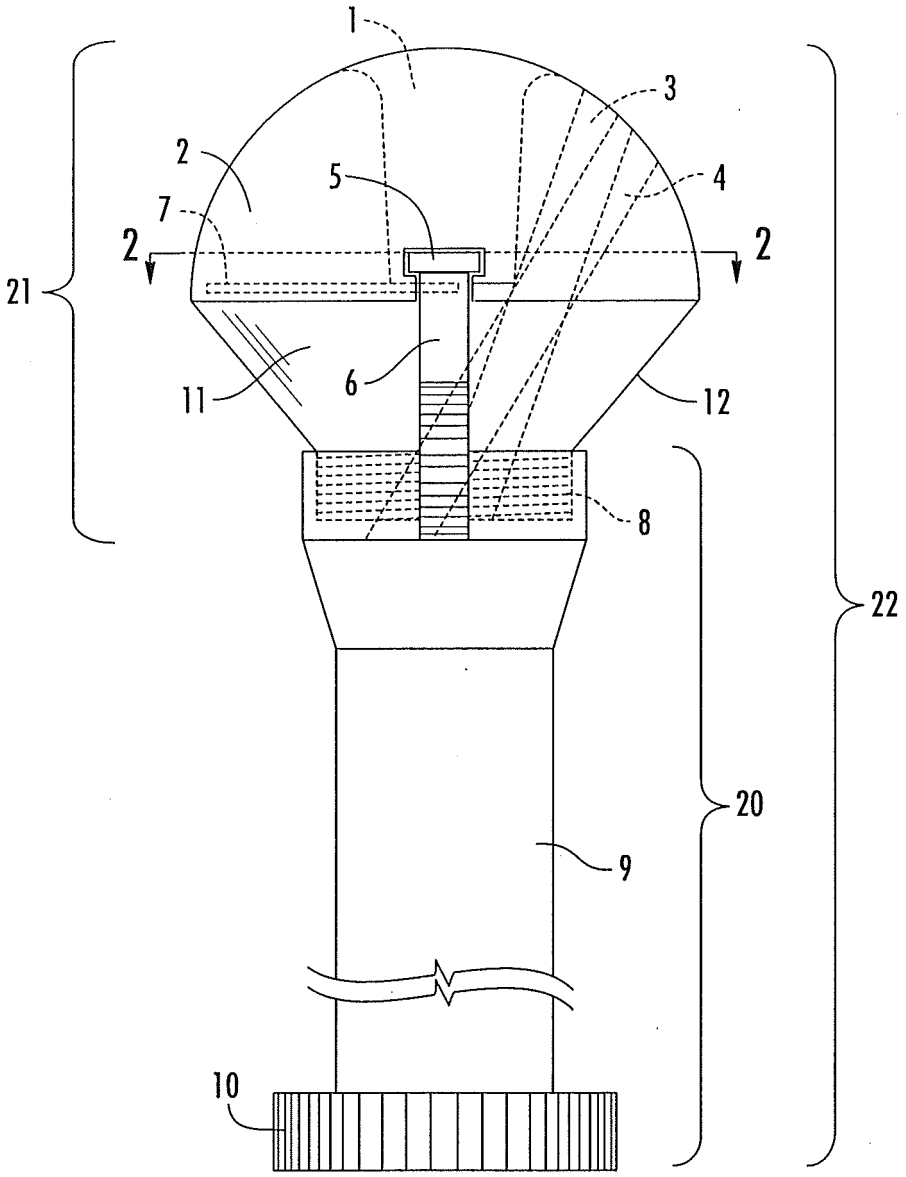

FIG. 1

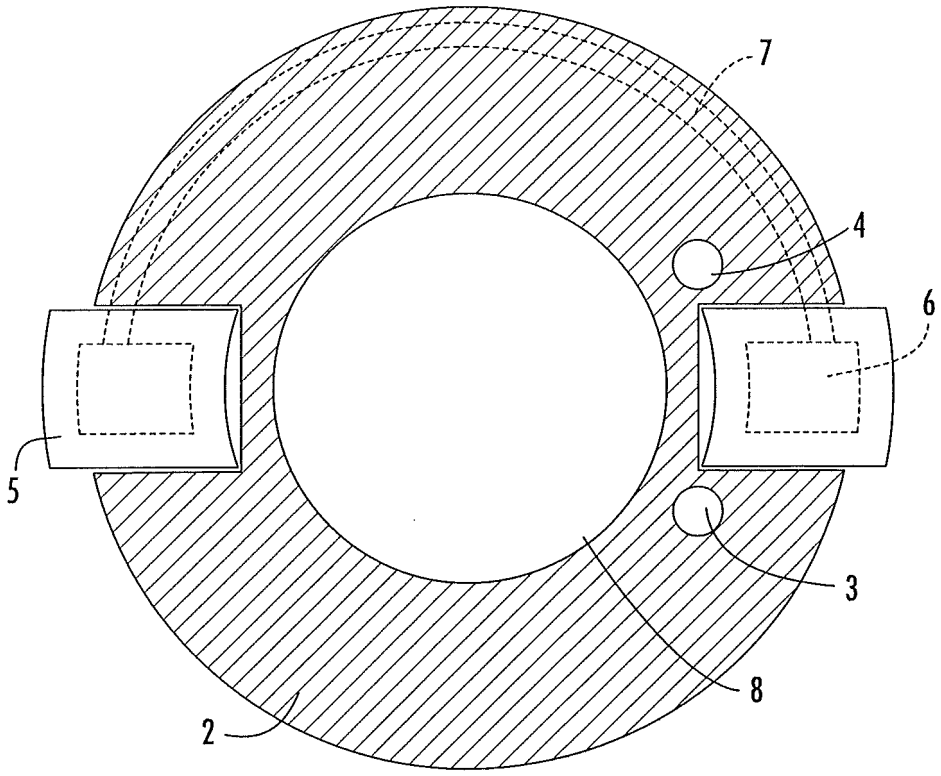

FIG. 2

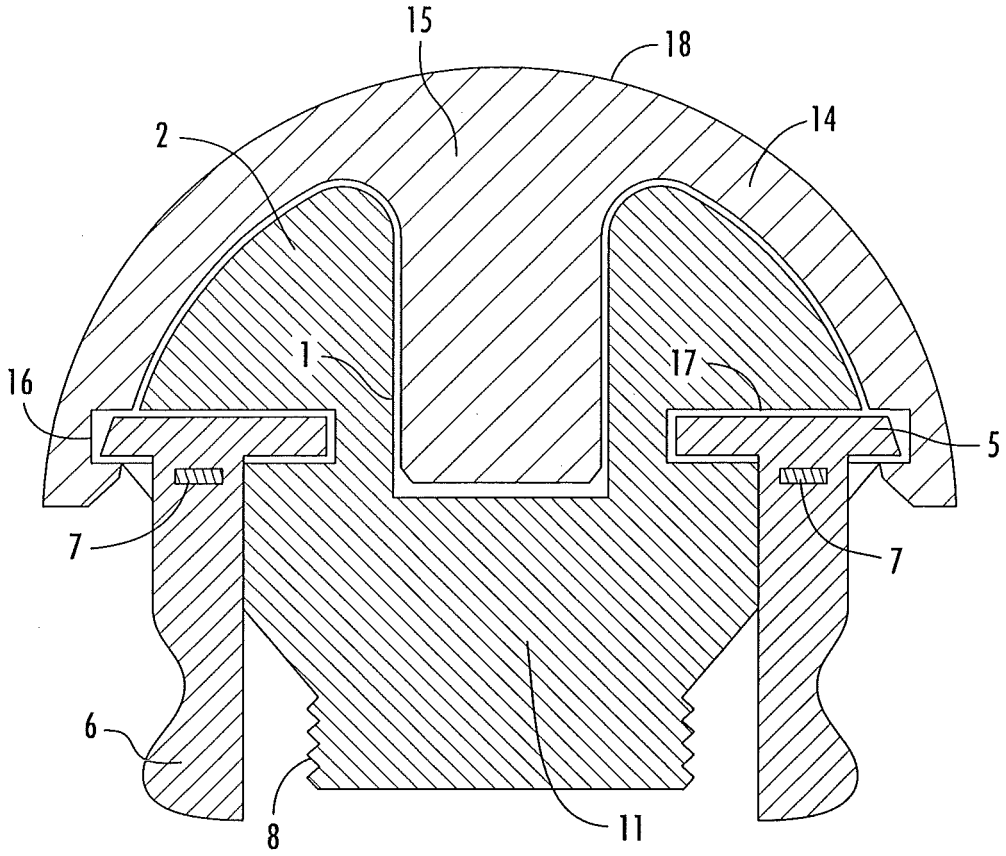

FIG. 3

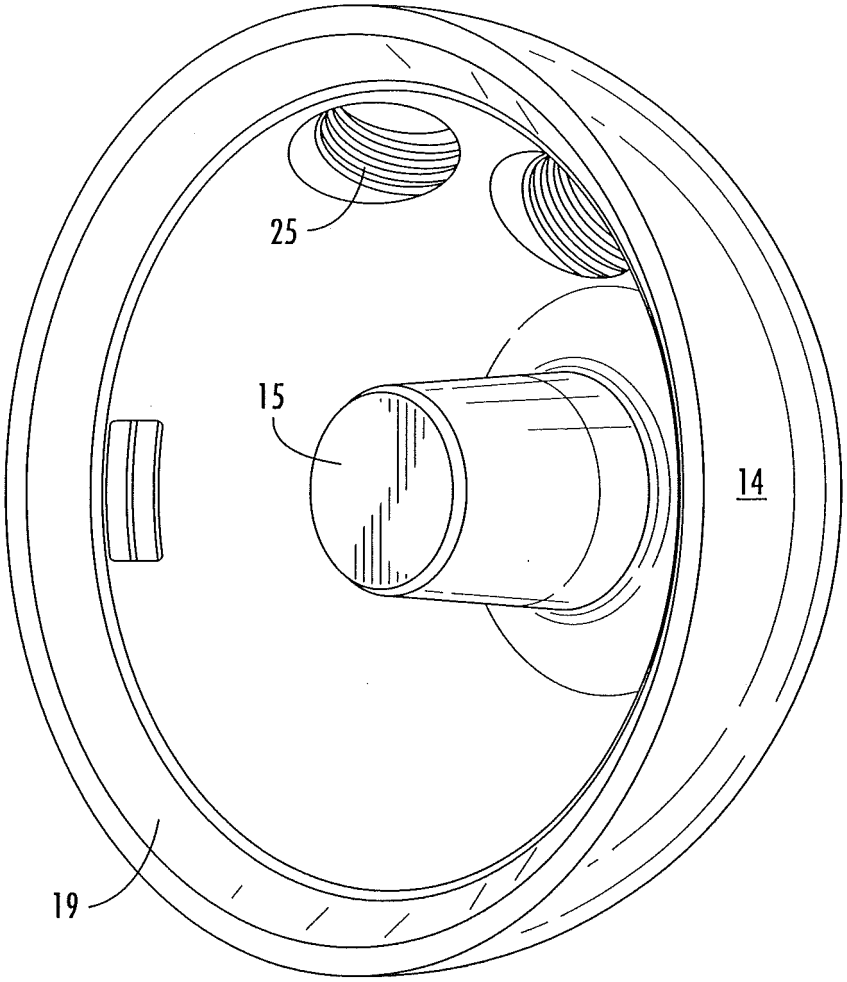

FIG. 4

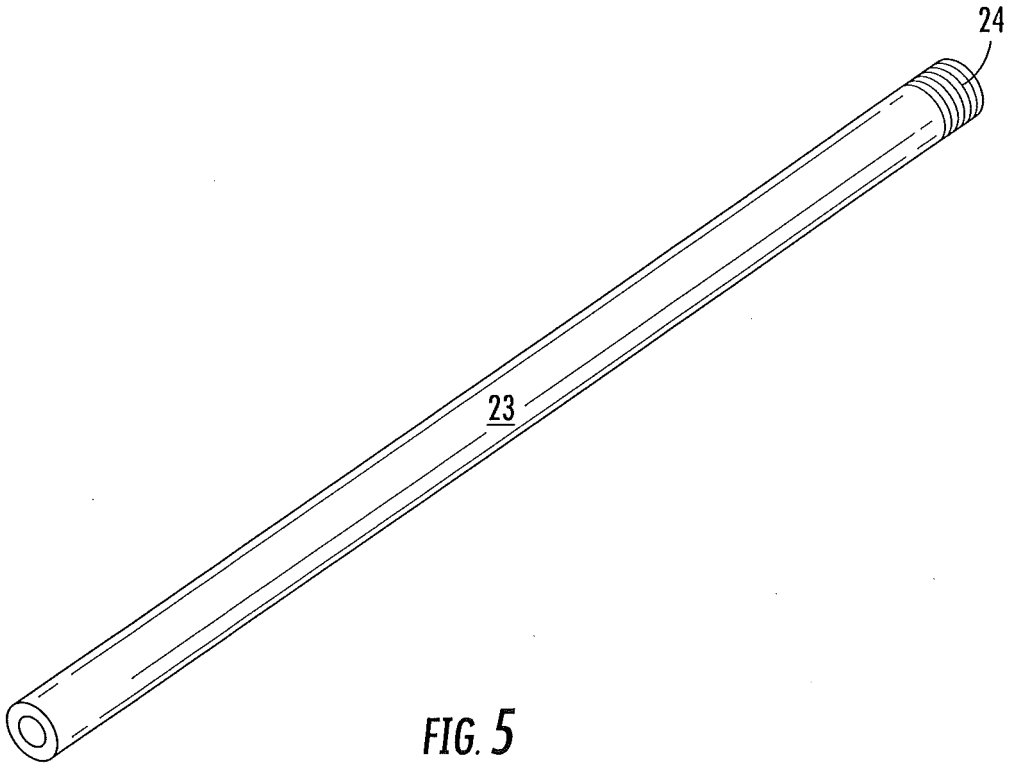

FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2011112353 A1 **[0001]**
- US 20110218637 A1 **[0001]**
- US 7727282 B **[0002]**
- WO 2004069107 A **[0002]**
- DE 102008022329 **[0002]**
- US 5540697 A **[0002]**
- FR 2776182 **[0002]**
- US 5431657 A **[0002]**
- US 3916451 A **[0002]**
- US 2005085820 A **[0002]**
- US 2005203535 A **[0002]**
- US 5584837 A **[0002]**
- US 2009192621 A **[0002]**